Experiment # 3

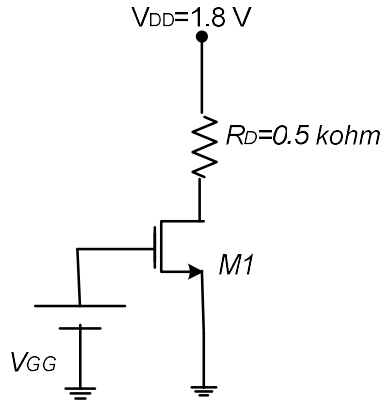
MOSFET Amplifier Characteristics: Common Source

The aim of this experiment is to explore the characteristic of NMOS common source amplifier circuit.

Introduction:

MOSFET is the main active device for modern integrated circuits (ICs). It is mainly used as a switch and also as an amplifier. Here in this experiment NMOS common source amplifier circuit will be characterized.

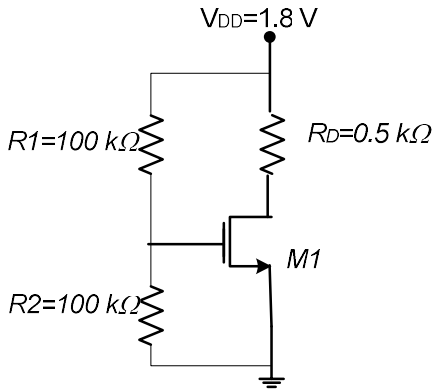
1. DC Characteristics of NMOS circuit:



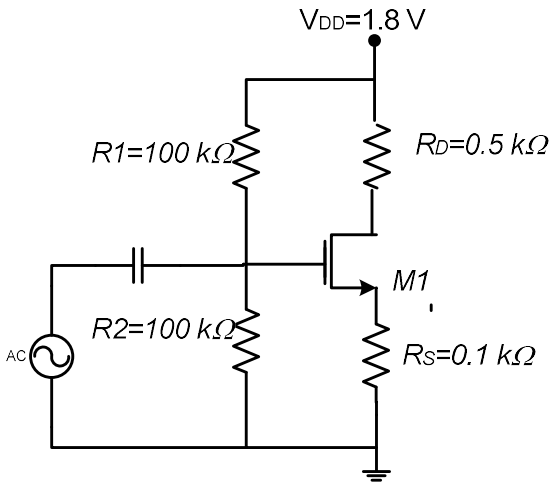
   (i) Take NMOS (W=25 µm, L=1 µm), V_{TH}=0.3V

   (ii) **Plot I_{DS} vs V_{DS}. Plot for five different values of V_{GS}: V_{GS} = 0.6V, 0.9V,1.2V, 1.5V and 1.8V**.

2. DC operating point: Find the DC operating point and check whether the circuit is in saturation or not.



3. Common Source Amplifier:



(i) Apply sine wave (peak to peak 20mV, 10 kHz) through a capacitor 0.1 µF**. Plot input and out signal with respect to time. Output is measured at Drain of MOSFET (with and without a capacitor 0.1 µF connected at Drain of MOSFET). Take Rs=0 ohm and also Rs=100 ohm.**

(ii) Plot Gain (dB) vs Frequency (500 Hz - 5 MHz) of the above circuit (in (i)), take Rs=0 ohm.

(iii) Find the Bandwidth of the amplifier.

(iv) Repeat the plot (ii) by changing R_D = 1 kΩ, take Rs=0 ohm.

(v) Discuss the effect of R_D and R_S on gain.